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LETTERS TO THE EDITOR.

*.*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

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Unconscious Bias in Walking.

THE question is again raised as to the cause of the deviations from a right line in walking with the eyes closed, or in the dark, in the letter to the editor with the caption "Is Man Left-Legged" (*Science*, xiv. p. 412). Several theories have been advanced to account for the frequently observed phenomena referred to, which may be briefly stated as follows:—

1. The legs are not of equal strength, and the strongest outwalks the other, making a curve to the opposite side.

2. The relative dexterity with which the legs are used; some persons being right-legged, and others left-legged, regardless of strength or length. It is probable, however, that there will be the greatest dexterity with the strongest limb; and, if so, this is only another form of the first theory.

3. The legs are not of equal length, and a person will take the longest step *with* the longest leg.

4. The legs are not of equal length, and a person will take the longest step *from* the longest leg.

In the last two theories, it will be observed, opposite conclusions are reached from the same assumed facts.

Several years ago I made a careful series of experiments with forty-nine young men to test the correctness of these theories. Their legs were accurately measured to determine the length, and a dynamometer was used to ascertain the relative strength. The curves representing their bias in walking when blindfolded were accurately traced and plotted on a diagram, so that they could be readily compared and studied.

The results of these experiments (published in *Nature*, July 30, 1885) were as follows: Of five cases in which there was no bias, in two the right leg was longest (in one of these the right leg was strongest, and in one the strength of the legs was not tested),—one presented the greatest difference in length of legs, and the other more than the average of those with right leg longest,—and in three the legs were of equal length (in one of these the right leg was strongest, and in two the left leg was strongest (*a*)). Four were right-handed: one used right and left with equal dexterity (*a*). In pointing at a distant object with both eyes open, in three the right eye was dominant, in one the left eye was dominant, and in one both eyes were apparently used to determine the range. Of fourteen cases in which the bias was to the right, in five the right leg was longest (in two the right leg was strongest, in two the left leg was strongest, and in one the strength of the legs was not tested), in four the left leg was longest (in three the right leg was strongest (*a*), and in one the left leg was strongest), and in five the legs were of equal length (in two the right leg was strongest (*a*), and in three the left leg was strongest). All were right-handed. In pointing at a distant object with both eyes open, in twelve the right eye was dominant, and in two the left eye was dominant, the latter in the groups marked (*a*). Of thirty cases in which the bias was to the left, in eight the right leg was longest (in five the right leg was strongest (*a*), in two the left leg was strongest, and in one the legs were of equal strength), in ten the left leg was longest (in five the right leg was strongest (*b*), in four the left leg was strongest (*b*), and in one the legs were of equal strength), and in twelve the legs were of equal length (in five the right leg was strongest, in five the left leg was strongest (*b*), and in two the strength of the legs was not tested). One was left-handed (*a*), twenty-five were right-handed, four used right and left with nearly equal dexterity (*b*). In pointing with the finger at a distant object with both eyes open, in twenty-two the right eye was dominant, in six the left eye was dominant, and in two both eyes were apparently used to determine the range.

From the facts here presented, it is evident that the relative length or strength of the legs cannot be assigned as the cause of

the observed bias in walking. The phenomena in question can, however, be readily explained by the application of well-established physiological principles.

When walking in a straight line, the muscles of locomotion are made to act in orderly correlation through impressions received by the senses and conveyed to the nervous centres, and thence transmitted to the muscles by the motor nerves.

When a person is blindfolded, or in the dark, or in a mist, the senses cannot serve as guides to direction, and the muscles of the two sides of the body may not act with the same energy, from differences in nutrition, or from lack of co-ordinating impulses from the nervous centres; that is to say, an exact equilibrium in the muscular activity of the two sides of the body can only be secured through the co-ordinating influence of the senses acting through the nervous system. When this directive agency is not available, a divergence from a direct course will, in most cases, follow from a lack of bilateral symmetry in the functional activity of the muscles.

MANLY MILES.

Lansing, Mich., Dec. 26.

The Influence of Baking-Powder Residues on Digestion.

THERE has always been more or less discussion over the question of what a pure baking-powder should consist, and which of the constituents of many kinds of baking-powders are most deleterious to the human system.

The manufacturers of different brands of powders obtain endorsements from eminent chemists that theirs is the only powder on the market which does not exert a harmful effect when taken every day in our food.

What one manufacturer calls an adulteration another claims is beneficial to the health, when taken in small quantities. This is especially true in the case of the animated discussion in the newspapers at the present time between the manufacturers of the various phosphate baking-powders and those who produce a powder made of bicarbonate of soda and cream-of-tartar.

The manufacturers of the latter brands advertise that theirs does not contain any calcium phosphate, and look upon this compound as an adulterant; while the firms interested in the sale of the former brands laud the use of phosphates in food, at the same time claiming that the bicarbonate of soda and cream-of-tartar form, after baking, a residue of Rochelle salts, the constant introduction of which daily into the stomach would prove very deleterious to the action of the gastric juice.

While these claims are made by the different manufacturers merely for the purpose of selling their own goods, and consequently the harmfulness of their rivals' products greatly overdrawn, yet in a measure the claims of both are true.

That all baking-powders have, to a greater or less degree, a retarding action on digestion by reason of the difficultly soluble salts left as residues after the process of baking, no one doubts; but now the question arises, "Which of the constituents used in the manufacture of baking-powders have the least injurious effects?"

In order to learn what were the most common adulterants of baking-powders, the writer made a tour of many grocery-stores in the city of New Haven, and was enabled to purchase thirteen different brands. In all cases it was found that the cheaper brands, and those offering inducements to the poorer classes by reason of their gifts of household articles, etc., with the purchase of their powders, were adulterated to by far the greatest extent.

The adulterations in some of these cases were not of a harmful character in themselves; e.g., starch was used in a very liberal quantity on account of its being so much cheaper than bicarbonate of soda and cream-of-tartar.

The only ill effect produced by the use of starch is, that, the strength of the powder being lessened so much by the absence of the proper amount of bicarbonate of soda, the housekeeper is forced to use a great quantity of the powder in order to cause the liberation of carbonic-acid gas necessary for the lightness of the bread or pastry. Thus the stomach gets a greater dose of impurities, which generally occur in a powder adulterated with starch, than it would from a powder not containing the latter ingredient.